Justin Cahoon
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GEOG 385

SENIOR CENTERS AND THEIR PROXIMITY TO PUBLIC TRANSIT: A GEOPROCESSING WEB APPLICATION

PROJECT SUMMARY

As the age of our community members continues to grow, so will the need to provide them with transportation options for personal, professional, and recreational desires. Though mobility might be something that younger citizens may take for granted, the mobility and independence are of high importance to senior citizens, particularly as they get older. When older Americans reach a point in their lives where their driving is limited or no longer an option, public transportation can play a key role in maintaining their quality of life. If established correctly, public transportation can offer non-motorists mobility, access, and most importantly, overall freedom. While many seniors do not currently use public transportation in their community, research has shown a higher likelihood of using it if it were more readily available and was focused on the destinations most important to them.

The goal in developing this web application is to provide a service that allows the user to assess their proximity to the public transit options within Roseville, California, specifically centered on the senior population as it pertains to age demographics and senior community location statistics. Transit routes and service stops from Roseville Transit's local fixed route services were created and used to develop this app so that seniors could find the closest transit stop within a relative proximity to their specific senior community location.

DOCUMENTATION OF METHODOLOGY AND STEPS

To start, the first step was to obtain data. Data was not only gathered from City and County sources, but new data was also created to develop the app so that proximity could be assessed. GIS Data from the City of Roseville's website was compiled and assessed for validity and used as a starting point to create a transit route map in ArcGIS. Route configurations, as well as ancillary data layers were used to produce a draft of the initial service area (Exhibit A). Once route data was developed, a database of senior communities was then created (using a combination of

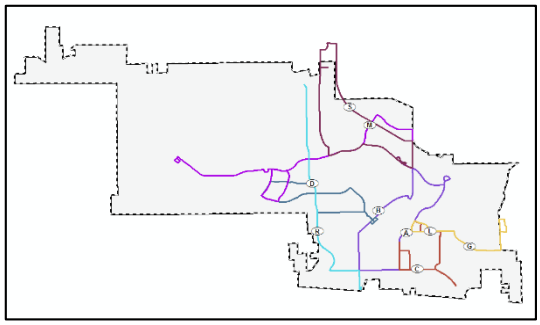

Exhibit A: Initial ArcGIS Route Map of Roseville

Google Maps data and the MS Excel platform) to show to relational locations of these communities (Table 1).

Included in this spreadsheet were latitude and longitude coordinates of each senior facility so that a point based shapefile could be created to visually display these locations in relation to where the transit routes were located. Once the spreadsheet was complete, it was converted to a comma-separated values (CSV) file format so that the table could be imported correctly into ArcGIS.

	SENIOR_FACILITY_NAME	CLASSIFICATION_TITLE	STREET_NUMBER	STREET_NAME	STREET_SUFFIX	ZIP_CODE	CITY	LAT	LONG
2	Sun City Roseville	Senior Community	140	Delta Breeze	Court	95747	Roseville	38.77757	-121.347874
3	Mistywood	Senior Apartment	1275	Pleasant Grove	Boulevard	95747		38.775161	-121.317318
4	Eskaton Village Roseville	Assisted Living Facility	1650	Eskaton	Loop	95747		38.797239	-121.334828
5	Roseville Commons, Ray Stone Seniors	Senior Community	275	Folsom	Road	95678		38.746988	-121.276259
6	Sierra Regency	Retirement Home	1015	Madden	Lane	95661		38.731988	-121.274832
7	Sierra Pointe	Assisted Living Facility	5161	Foothills	Boulevard	95747		38.762212	-121.309207
8	The Terraces of Roseville	Assisted Living Facility	707	Sunrise	Avenue	95661		38.735525	-121.270765
9	The Club by Del Webb	Senior Community	2159	Langtree	Drive	95747		38.771009	-121.361382
10	Sutter Terrace Apartment Homes	Senior Apartment	6725	Fiddyment	Road	95747		38.769563	-121.358557
11	Palms	Assisted Living Facility	100	Sterling	Court	95661		38.741141	-121.246773
12	Emeritus at Roseville Gardens	Assisted Living Facility	1	Somer Ridge	Drive	95661		38.728012	-121.283168
13	Silver Ridge Senior Apartments	Senior Apartment	1101	Stone Canyon	Drive	95661		38.760546	-121.243171
14	Somerford Place of Roseville	Nursing Home	110	Sterling	Court	95661		38.741001	-121.248321
15	Alta Manor	Assisted Living Facility	930	Oak Ridge	Drive	95661		38.732982	-121.26835
16	Woodcreek Terrace Apartments	Senior Apartment	1295	Hemingway	Drive	95747		38.770346	-121.316911
17	Roseville Care Center	Nursing Home	1161	Cirby	Way	95661		38.730139	-121.274343
18	Oakridge Healthcare Center	Nursing Home	310	Oak Ridge	Drive	95661		38.741949	-121.270256
19	Holiday Retirement	Retirement Home	1275	Pleasant Grove	Boulevard	95747		38.771051	-121.31718
20	Manzanita Place	Senior Apartment	1019	Madden	Lane	95661		38.73129	-121.274265
21	Age Advantage of Roseville	Senior Community	735	Sunrise	Avenue	95661		38.733227	-121.271069

Senior_Center_LAT_LONGs

Table 1: Excel Table of Senior Facilities

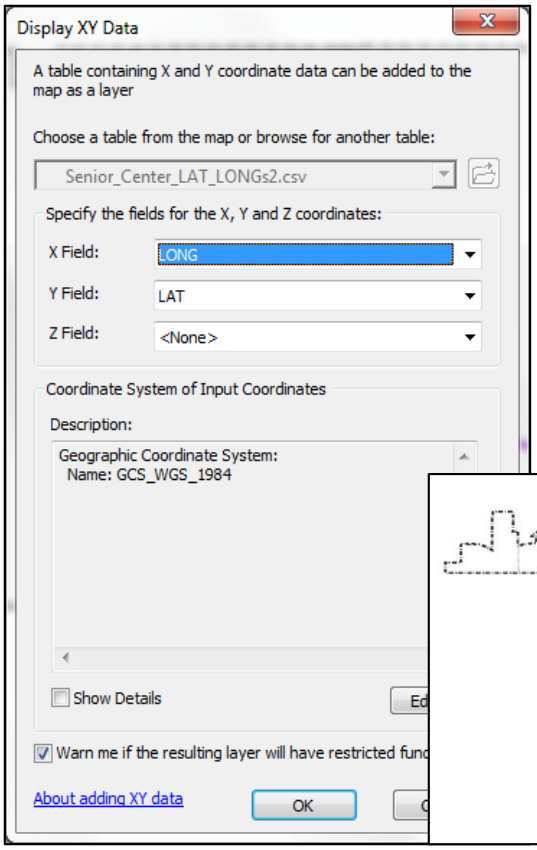

Exhibit B: ArcGIS "Display XY Data" tool

After importing the CSV file into ArcGIS, projection and coordinate information were defined for the file so that it would line up with other shapefiles in the map. Once this was complete, the "Display XY Data" tool was run in ArcGIS which automatically takes the latitude and longitude values in the table and places points on the map according to those coordinates (Exhibit B).

The points created from this process visually displayed the locations of senior facilities, as they related to the current transit routes (Exhibit C).

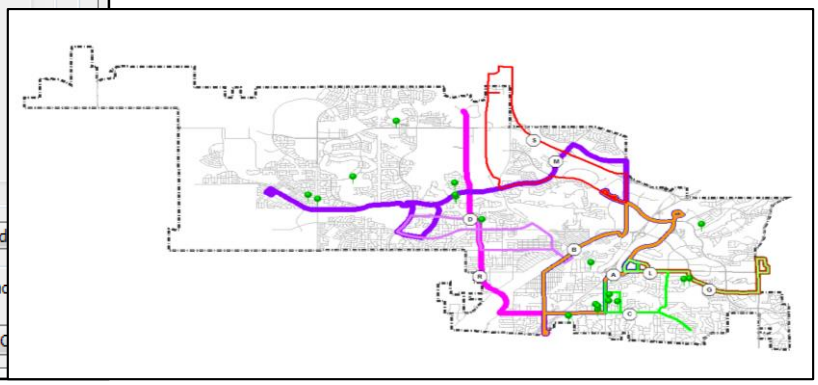

Exhibit C: The resulting display

Though useful, this information alone was not enough to proceed with the development of a useful web app. To truly be user friendly to seniors at these locations, data on specific transit stops along these routes was needed. It would not be enough to assess whether a senior was within walking distance to a transit route because they would still need to have access to an actual bus stop in order to use the service. Staff at the City was contacted by email in an attempt to obtain coordinate data for each transit stop. Fearing that this information was not available, it was decided that a new spreadsheet should be manually created with X,Y data for each transit stop. A combination of data included in transit service brochures from the City and data gathered on Google Maps, a spreadsheet was developed which contained the X,Y coordinate data for each of the 215 transit stops within the City of Roseville's local route service. Then, after all that was done, an Assistant Engineer from the Public Works - Alternative Transportation Department at the City of Roseville provided me with an Excel table of the City's transit stop data, which was used to develop the app (Exhibit D).

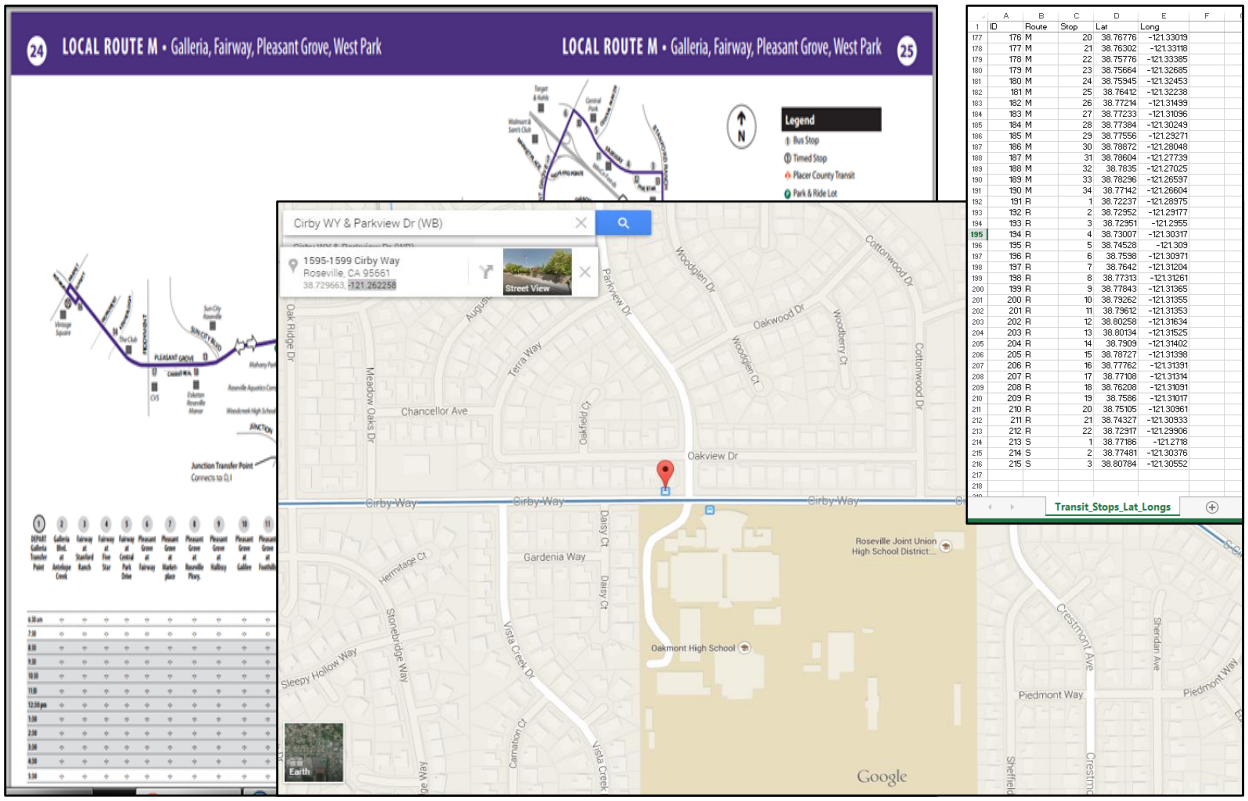

Exhibit D: Data used to create point data for transit stops

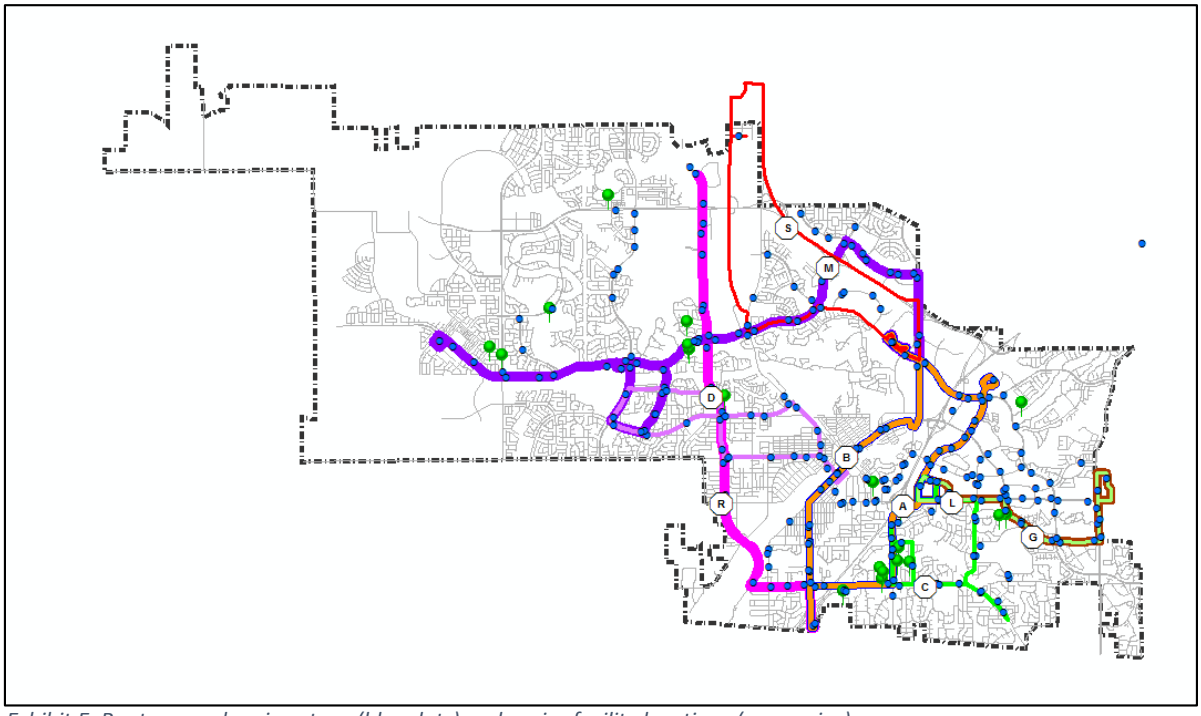

Exhibit E: Route map showing stops (blue dots) and senior facility locations (green pins)

Once this spreadsheet was complete, a shapefile was created using the same "Display XY Data" tool that was detailed above. This resulted in a map that now showed the transit routes, their related stops along each route, and the locations of senior facilities in the area of interest (Exhibit E).

Once this was all complete, the app development could begin. The first step was to style and publish the map service online using ArcGIS. After running the "Analyze" tool within publishing the service, no errors were recorded. The "Publish" button was then selected and was "completed successfully". The ArcGIS Server Manager program was then used to access the REST URL and to modify certain descriptions (Exhibit F). After attempting, and failing, at doing a geocoding address locator, it was decided that a geoprocessing tool would be developed for the purposes of the app.

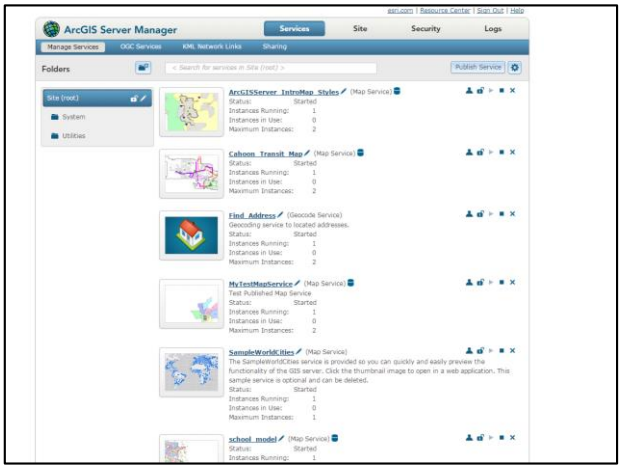

Exhibit F: ArcGIS Server Manager

Using the "Geoprocessing_Services_pt1" exercise as a guide, the first step in this process was to create a model. After accessing ArcCatalog, a new "Toolbox" was created in a local folder, then a new "Model" (Exhibit G).

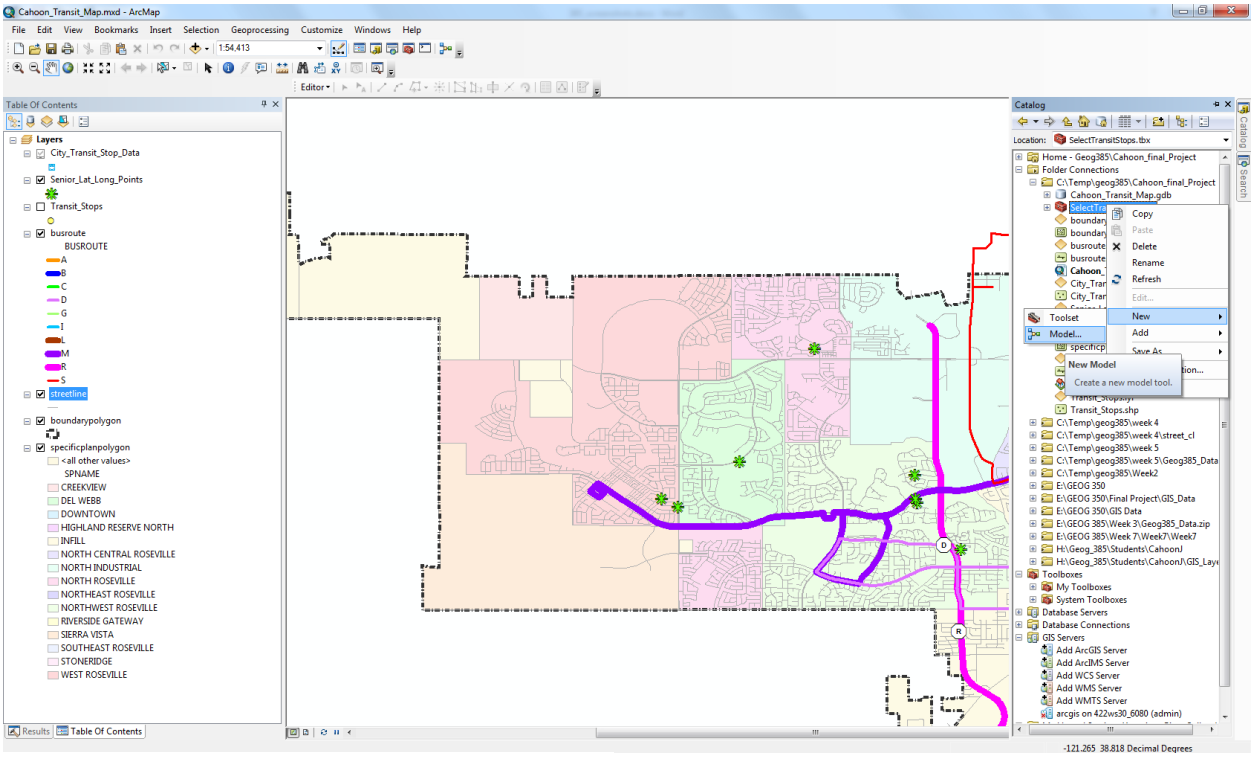

Exhibit G: Steps to create Model in ArcCatalog

After opening up a new model canvas, the SelectLayerbyAttribute and SelectLayerbyLocation tools were added, as well as the CopyFeatures tool. From here, my "City_Transit_Stop_Data" and "Senior_Lat_Long_Points" were then added to the canvas. The "Senior_Lat_Long_Points" layer was then connected to the SelectLayerbyAttribute and the "City_Transit_Stop_Data" was connected to the SelectLayerbyLocation tools respectively. After creating certain variables, preconditions, and setting model parameters, the SelectLayerbyAttribute was clicked on and SQL builder was opened. For this routine, the "Senior_Lat_Long_Points" layer was added and a **"NAME" = '%Senior Center Name%'** expression was developed. The "Sun City Roseville" value was added to the Senior Center Name to provide a default value for this parameter in the model. A linear "Search Distance" variable was then added and set to "0.25 miles". Next the SelectLayerByAttribute output (Selected Senior Center) was connected to the SelectLayerByLocation routine as the Selecting Features, which was then renamed "Selected Transit Stops". Next, the Selected Transit Stops output was then connected to the Copy Features routine as the Input Features, at which point its output was renamed "Output_Transit_Stops" After all model parameters were set, the full model was complete (Exhibit H).

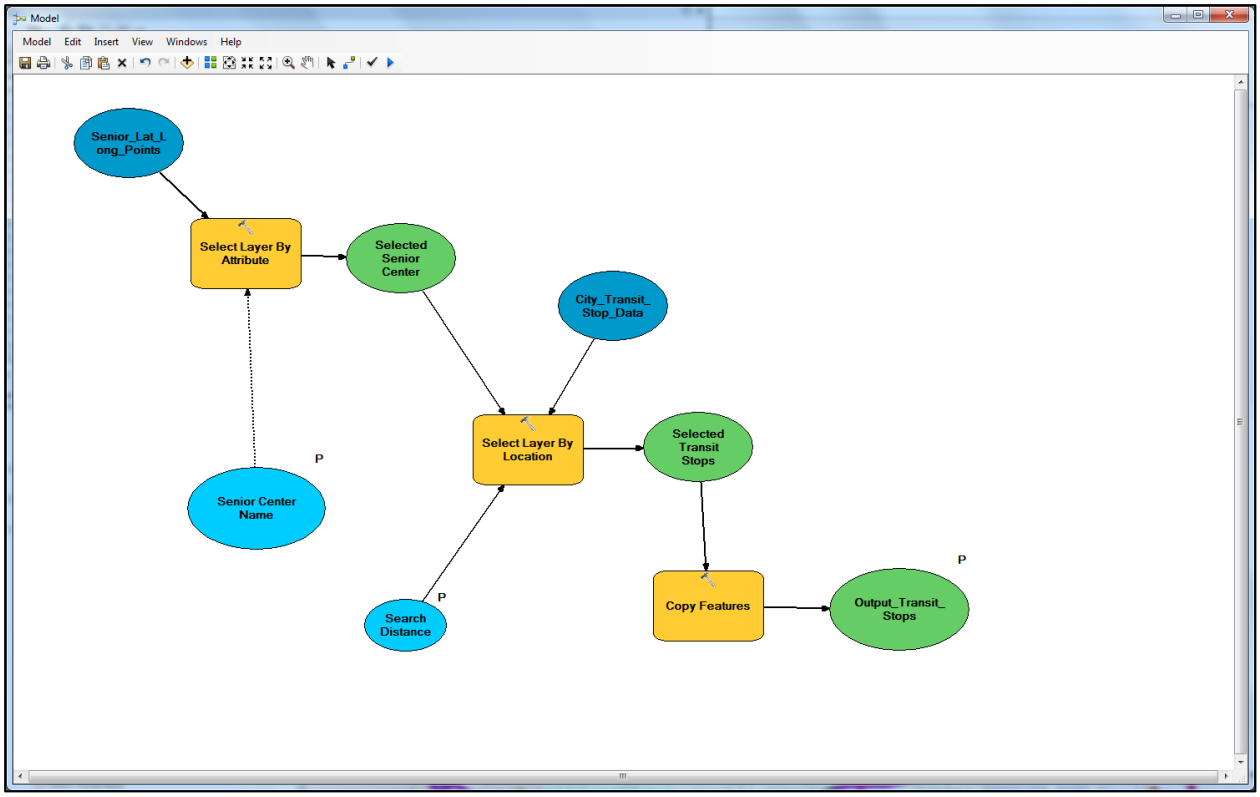

Exhibit H: Full model of geoprocessing app

A Value List was then created so that users could select their appropriate senior center from a drop down list of all senior centers in Roseville. This was done by clicking on File, then Model Properties, then selecting the Parameters Tab and choosing Value List from the drop down list for the Senior Center Name parameter (Exhibit I). Fortunately, there were only 20 Senior Center names, so Python scripting was not necessarry. The model was then saved and run from the Catalog tab. After styling the new data, the tool was then shared as a geoprocessing service and published as previously described above. The View Results with a Map Service option was checked and all necessary "required values" were filled in. The service was then analyzed for errors then published successfully (Exhibit J).

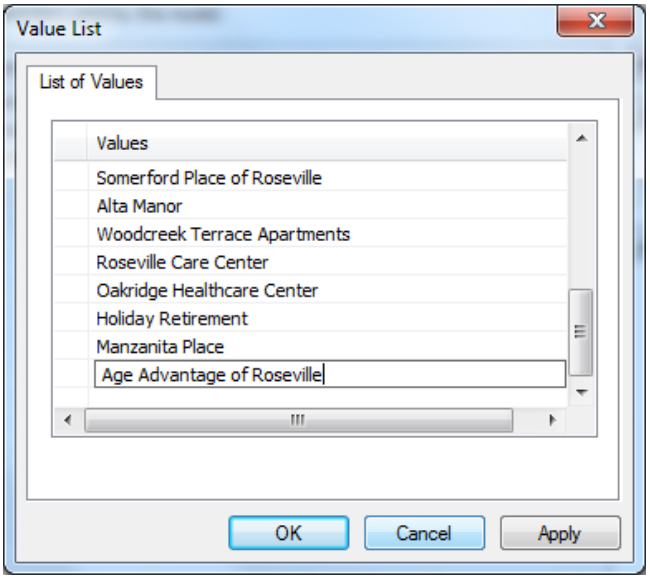

Exhibit I: Value List for app dropdown of Senior Centers

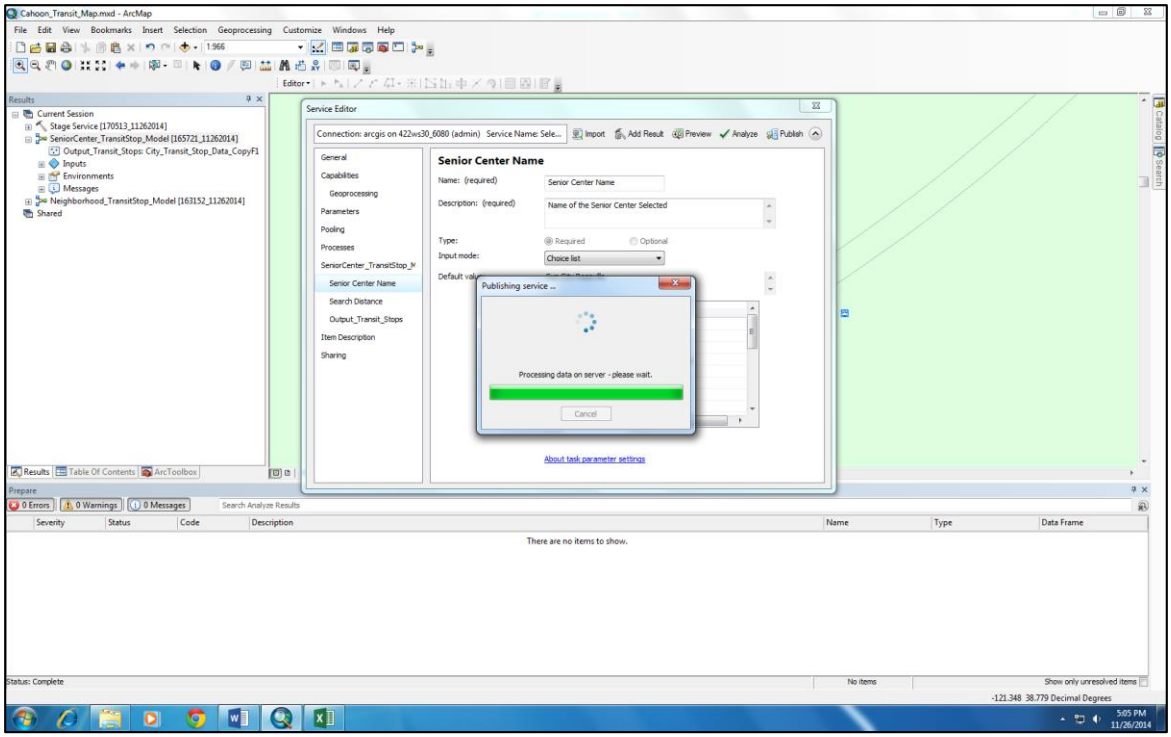

Exhibit J: Publishing of geoprocessing service.

After successfully publishing the geoprocessing service, the ArcGIS Flex Builder program was utilized to maintain and modify the service for user interaction. The "Finding Transit Stops" service was added to the existing, published map service application as a widget through the "Edit" feature. Here, the Task URL (REST endpoint) was added to the geoprocessing Widget by copying and pasting from the ArcGIS Server Manager properties in the toolbox previously created. Then, as an added bonus, pop-up feature capabilities were added to the route, senior center, and transit stop layers for further ease of use. The transit route layer also included the added feature to click on a media hyperlink which would take the user to the City of Roseville Transit's website so that current scheduling and specific routing information could be accessed (Exhibit K).

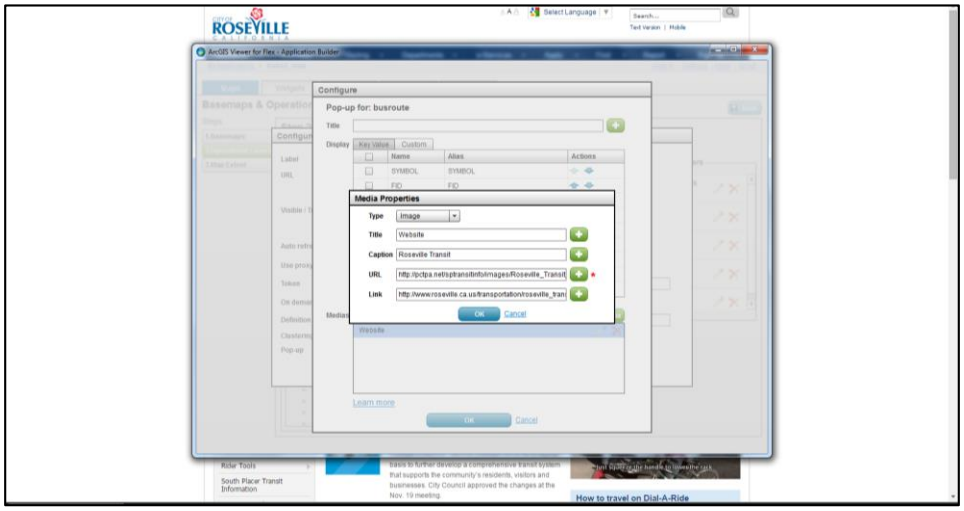

Exhibit K: Adding pop-up capabilities to geoprocessing service.

CHALLENGES/RESOLUTIONS

This project was not without its issues. The first issue was simply the availability of the data. As noted above, the transit stop data was not readily available. After emailing an employee of the City, I assumed that this data for my project that I was requesting was not of high concern to them, so I ended up developing my own data using Google maps. It was only until after this task was completed (finding and documenting 215 individual transit stops), that I received and email from the City, which included the Lat/Longs of each point. Though my personal creation of the data seemed like a waste of time, it did end up to be great experience and the data ended up lining up exactly with the points I created. Next, I initially wanted to provide an address locator through geocoding, but could not figure out how to make it work. I relied too heavily on the exercise we did, which its instruction were specific only to that data in which was provided. With this project, I was working with different data and couldn't figure out the right values to fill in to the specific parameters to make that service a success. Then I created an "Identify" tool, which really didn't do much. I think the main challenge was really trying to assess a NEED and its relative usability for an app, something user-friendly and pertinent to someone's life. Only after I finally figured out how to apply a web app to a real-life need, did the project really come into focus.

CONCLUSION AND DISCUSSION

A proper evaluation of the relative level of transportation options (via public transit) for senior citizens in any given area must take into consideration a multitude of variables. For example, desirable and necessary destinations to the specific demographic; available transit stops within walking distance of living facilities; knowledge, education, and interaction of the transit network (either by actual use or virtual methods like an app) a street and sidewalk network with adequate access, visibility, and safety measures to access said stops; and many others are needed to produce a transit system with optimal ridership. The development of this app was done to assist a specific demographic in making knowledge of the transit system in this specific area of interest more interactive for those considered to be in the most "ride dependent" community. Hopefully not to stereotype, but it should be noted that this specific demographic may not be informed on the current and future developments and applications regarding web-based tools for such a service, the intent of this project could possibly be applied to other groups of transit users.

Though the development of this app showed there are some geographic gaps in transit service as it pertains to a few senior centers, for the most part, Roseville Transit has transit stops located within a walkable distance to most these communities. Additional applications for a similar service that might be taken into consideration that this project did not attempt might include optimal routes that a senior would take to reach a transit stop; tables listing the quality, access, visibility, and safety of the street and sidewalk network used to access each stop; private transit options provided by senior facilities; the "Dial-A-Ride" service provided by the City; and most traveled destinations by the senior community with a focus on medical services.